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# United States Patent [19]

Suzuki et al.

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[54]	LIQUID CRYSTAL DISPLAY DEVICE AND
	METHOD OF PRODUCING THE SAME
	HAVING AN IMPROVED CONNECTION
	BETWEEN A FLEXIBLE FILM SUBSTRATE
	AND A DRIVE CIRCUIT SUBSTRATE

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[56] References Cited

## U.S. PATENT DOCUMENTS

4,697,885	10/1987	Minowa et al	359/88
4,964,700	10/1990	Takabayashi	359/88
4,985,663	1/1991	Nakatani	359/88

#### FOREIGN PATENT DOCUMENTS

0149458	7/1985	European Pat. Off	359/88
59-149327	8/1984	Japan .	
60-225828	11/1985	Japan .	
61-169160	7/1986	Japan .	
0215528	9/1986	Japan	359/88
62-35473	2/1987	Japan .	

64-54739	3/1989	Japan .
1235923	9/1989	Japan .
	3/1991	
0184023	8/1991	Japan 359/88

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# 57] ABSTRACT

A liquid crystal display device using a flexible film as a panel substrate is produced such that the panel substrate is connected to a drive circuit substrate detachable for reuse, that transparent electrodes on the panel substrate are free of damage from conductive particles in the connection, and that a hotmelt adhesive for connection may be prevented by a simple arrangement from being deteriorated with outside air. The liquid crystal display device employs the panel substrates of flexible film, in which transparent electrode terminals formed on the panel substrate are connected to wiring terminals formed on a drive circuit substrate. A radiation-setting adhesive such as an ultraviolet-curing adhesive and a photo-setting adhesive is coated on a surface of a connection portion forming the transparent electrode terminals of the panel substrate. Conductive members are projectively provided on a surface of a connection portion forming the wiring terminals of the drive circuit substrate. A hotmelt adhesive covers a surface of the drive circuit substrate including the conductive mem-

# 14 Claims, 5 Drawing Sheets



